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## Universities Response to Oil and Gas Industry Demands in South Texas (USA) and Tamaulipas (Mexico)

### Abstract

Given the importance of hydrocarbons for this area, the purpose of this paper is to explore the response of universities to cope with new demands in the south of Texas and Tamaulipas, especially in relation to gas plays of Eagle Ford (Texas side) and Burgos Basin (Mexican side). To accomplish this task, in the first section of the paper a broad review of selected Texas universities is done, distinguishing their most relevant moves during the last three years. In the second section we do the same for the higher education institutions in the State of Tamaulipas, México. In the third and last section we end up with some final comments about the response of universities to cope with energy sector new demands in both sides of the border. Although related to research, in Texas the response of universities is diverse and also disperses; whilst in Tamaulipas the response mainly consists of new education provision to train human capital.

Keywords: hydrocarbons, higher education, Texas, Tamaulipas

### Introduction

The border between United States of America and Mexico is acknowledged as an area of intense bilateral relations, in such a way that it is difficult to make a clear-cut separation in terms of ethnicity, culture or skin color (Sepúlveda, 1958). According to 2009 Census of United States, 94% of the population in the border held a Mexican identity. Furthermore, besides demographic similarities it is also acknowledged that in the area there is an old and growing economy across the border and through the mass media, commerce and services (Kilburn, San Miguel & Hoon Kuak, 2013).

The public announcement of natural gas new reserves and the reforms to the energy sector initiated by Mexican government in 2013, introduced new relations in the dynamics of the border with a growth of operations in Mexico by companies from the south of Texas, posing new demands to universities, since they are called to train the human capital needed for the different levels and aspects of hydrocarbons exploitation (Gil Valdivia, 2013), for researching on the quality and efficiency of technological processes as well as on its social and environmental impact (Barnés de Castro, 2013).

Once the region's oil and gas reserves were announced, actions were taken by universities in both sides of the border. The information used in this section was gathered by the author from institutional web pages and from interviews conducted during the months of October 2014 and February 2015. The aim of these interviews was to explore opportunities for mutual academic collaboration.

Given the importance of hydrocarbons for this area, the purpose of this paper is to explore the response of universities to cope with new demands in the south of Texas and Tamaulipas, especially in relation to gas plays of Eagle Ford (Texas side) and Burgos Basin (Mexican side). The former is located within the nine world's

major hydrocarbons exploitation fields in terms of probable reserves, and the latter with a probable reserve of 545 billion ft<sup>3</sup> of Shale gas and 13 million barrels of oil, making this Mexican region the third most important in the world (Redacción SDPNoticias.com, 2014).

To accomplish this task, in the first section of the paper a broad review of selected Texas universities is done, distinguishing their most relevant moves during the last three years. In the second section we do the same for the higher education institutions in the State of Tamaulipas, México. In the third and last section we end up with some final comments about the response of universities to cope with energy sector new demands in both sides of the border.

Although an exploration of universities' reactions are observed in two countries, strictly speaking this is not a comparative education study. The units of comparison are not clear-cut selected. Neither are the states of Texas and Tamaulipas nor all of their universities, what we are comparing. Nevertheless, the essay's content belongs to the realm of international education and it is useful in order to explore some opportunities for collaboration and strengthening relations between educational institutions of these neighboring states.

### **The response of institutions in Texas**

Higher education in Texas includes 146 public and independent universities, from which 50 are *community colleges* with multiple *campi* (they offer two year programs and labor certifications); 38 are universities and public centers, 38 are independent universities and are related to health sector (Texas Higher Education Coordinating Board, 2013). A good part of public institutions are grouped in two systems: Texas A&M University and University of Texas.

The Texas universities selected for this initial exploration are those which are closer to the border with Tamaulipas: Texas A&M University International, Texas A&M University at Kingsville, The University of Texas at San Antonio and The University of Texas Rio Grande Valley. The reason for this selection was basically because are the ones situated in the surroundings of an area of hydrocarbons near to the Mexican side known as Eagle Ford and have made explicit their interest to produce personnel and knowledge for the energy sector.

#### *Texas A&M International University*

Texas A&M International University is located in Laredo, Texas, about ten miles from the city of Nuevo Laredo, Tamaulipas. It was born in 1970 as University of Texas A&I, with an offer of two year educational programs. It was until 20 years later when this university became part of the Texas A&M system, but it was until 1994 when it was granted the category of international, to implement graduate programs in conjunction with Mexican and Canadian institutions.

The international activity of this university has been especially remarkable during the last three years, thanks to its Binational Center created at the beginning of this decade. This is the office in charge of global initiatives and has produced a substantial amount of energy related activities with the National Association of Universities (ANUIES) and especially with the universities of the neighboring Mexican states of Coahuila, Nuevo León and Tamaulipas, like round tables and a consortium of universities, institutions and enterprises.

As a dean of the engineering department, the university hired a retired professor who was one of the seven members of the Mexican Commission of Hydrocarbons, and one of his first actions was to set an agreement with the Engineering Department of Texas A&M University at Kingsville, to develop joint activities related to hydrocarbons.

### *University of Texas at San Antonio*

In accordance with an interesting strategic plan, University of Texas at San Antonio (created in 1969) is focused in ranking's tier1, which means to become a research university. For that, it is renewing research centers and hiring new personnel like an outstanding Mexican researcher on the fields of physics and nanotechnology, and very familiar with science policies and research agencies in Mexico.

For the International Affairs Office, this 29 thousand students institution, hired another Mexican who previously held a position as provost for academic affairs in a research institution specialized in border issues such as migration policies and regulations.

### *Texas A&M University - Kingsville*

At the beginning of the twentieth century this institution was a teachers college and in 1929 became Texas College of Arts and Industries, and entered Texas A&I in 1967. It was until 1989 when this university became part of the Texas A&M system and rapidly included new academic programs, especially in sciences and engineering, highlighting Natural Gas Engineering.

Integrating scholars from different departments, in august 2013, the engineering school established the Eagle Ford Center for Research, Education and Outreach, to promote research capacities and faculty development; to organize workshops for promoting communication among academia, community organizations, industry and government about Eagle Ford Shale and technical aspects with a sustainability approach.

The first courses offered by the Center were directed to professionals already working in this field but wanted to broaden their knowledge and abilities related to supply, flows and treatment of waters associated with "fracking"; solid waste management and soil remediation; assessment and control of air quality; and meetings with communities affected by the development of shale gas extraction.

It is very interesting that the strategic plan of this institution is devoted to the improvement of English language of the students, allotting all kinds of resources, infrastructure, and faculty development. English writing is an important issue for this university since a large proportion of students enrolment comes from abroad, especially from Mexico and Middle East.

### *The University of Texas Rio Grande Valley*

Since autumn 2015, this university is the result of two universities merging: The University of Texas at Brownsville and University of Texas Pan-American together with the Regional Academic Health Center. The former, under the name of Southmost College, during a long period of time only offered two year programs. It was recently when the process of integration with UT Panam had begun receiving

students to proceed with four year programs, although there were also some merging graduate programs.

Within the south of Texas context and the UT system, this merging is very interesting, and although no energy program is set up yet, the new university is announced as a bi-national and bilingual institution. With no doubt this university will attract even more Mexican border students and will facilitate, in due time, their transfer to other universities of the same system.

### **The response of institutions in Tamaulipas**

In Tamaulipas, the higher education system holds 103 institutions, some of them with schools and departments in different cities of the state: 70 are private institutions, 12 are federal and state public institutions, 12 are state, 8 are federal and 1 is autonomous. All of them have a total enrolment of 111,518 students, distributed in 14 municipalities.

On September 10<sup>th</sup>, 2014, the governor Torre Cantu presented the Tamaulipas Energy Agenda, which incorporates with a high priority level, the subject of human capital and identifies some educational programs of different levels, as well as an amount of professionals that will be needed by the development of the energy sector; the document also states a list of training programs for high school level.

With the title of “Reorientation of education provision” the agenda states a number of educational programs related to the energy sector. It is expected that their curricula will be reviewed for their alignment to human capital demands. These programs are supplied by public institutions in different localities of the state of Tamaulipas.

The publication of the agenda was crucial for higher education to take decisions on designing and reviewing educational programs related to the energy sector. Although the response of these institutions was done on an individual basis, there is some evidence that they are being driven towards some forms of grouping.

#### *Technological institutes*

In this state there are six technological institutes located in Ciudad Madero, Mante, Ciudad Victoria, Nuevo Laredo, Reynosa and Matamoros. By September 2014, they were integrated to the Tecnológico Nacional de México and the institutions became its local expressions to be regulated by a General Direction. The capacity of local institutions for an independent decision making has its limits and the new organizational arrangement does not solve the old problem of centralization and instead of designing new programs they will refresh an old program, such as the one of engineering in renewable energies.

#### *Polytechnic universities*

This group includes the ones located in Altamira, Ciudad Victoria and the *Region Ribereña*. Only the first of the three runs the program of Engineering in Energy. Its curriculum has a special mention of electrical engineering. The other two universities run mechatronics in Victoria and Industrial engineering in the northern border. Those programs are the closest to the energy sector.

#### *Private universities*

On the other hand, under less controls than public universities, seven private institutions are already receiving enrollments for 13 undergraduate and graduate programs in fields like hydrocarbons and renewable energies, and in an important number of engineering programs, although some of them with a weak basic infrastructure for operations.

In a follow up exercise, carried out in April 2015, educational authorities of Tamaulipas presented another list of programs: 98 of them were identified as new (9 professional associate, 41 undergraduate, 4 specialties, 29 masters and 15 doctoral programs) and 31 to be reoriented (9 professional associate, 10 bachelor's degrees, 2 specialties, 8 masters and 2 doctoral programs). All of them will start operations between 2015 and 2016.

Meanwhile, since previous months, the autonomous university of Tamaulipas was developing a process of updating the curricula of all programs of professional associate and bachelor's degrees. In May 2015, the university authority approved the updating of 63 programs, denomination change of 7 programs and 20 brand new programs (11 bachelor's degrees and 9 professional associate) and the ending of 11 bachelor's degrees.

In reference to the programs related to the energy sector, logistics engineering, geomatics engineering, renewable energies engineering, economics and sustainable development were added to the programs of oil engineer and petrochemical processes engineer; and as new professional associate programs were added: management of energy business, harbor administration, logistics, geological exploration, hydrocarbons, solar energy and environmental remediation.

Besides educational programs, the autonomous university develops research activities related to the social and environmental impact of the energy activities; and also develops some contracts to develop technological services for energy public and private companies.

## **Final comments**

The purpose of this paper was to explore the universities response to gas industry demands in both sides of Texas-Tamaulipas border as part of a larger project with a larger objective related to gather information useful for human capital planning for the energy sector as recommended by experts (Domínguez Vergara, 2013).

It is observed that on the side of universities in the south of Texas, their affiliation either to Texas A&M or UT systems, did not refrain them from individual reactions to cope with the agenda, it seems to be that in this context there is a relationship of collaboration and competence that in one side allows them to participate not only of a financial fund (Permanent University Fund, 2014), but also of a source of prestige, as it is the trade mark of both university systems.

It is also observed that the Texan universities response was not a new provision of educational programs related to oil and gas industry, but the implementing and revitalization of research and development centers; so as the revitalization of the relationship with universities of the Mexican side of the border. This difference is clearly related to the asymmetries between the countries.

As a matter of fact, their strategic plans go by different pathways. Texas A&M International University increases relations with universities and companies in the

Mexican bordering states through the Binational Center; UT San Antonio moves towards a research university tier; Texas A&M Kingsville emphasizes its institutional development by developing English language of the students; while UT Panam merges with UT Brownsville to become a comprehensive university in terms of enrolments growth and diversity of programs.

Texan universities are hiring senior Mexican scientists with a deep knowledge and experience in higher education and the Mexican energy sector. On the other side, Mexican institutions generally reacted through the provision of undergraduate educational programs, although, in the case of the autonomous university with research and service programs, as well.

As in the south of Texas, the reaction of higher education institutions, to cope with new demands, was individualized. It was not a system reaction. Although Texans as well as Tamaulipas' institutions are grouped by subsystems, there is not a systems approach for the strategic planning of institutional development.

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